Lawrence Livermore National Laboratory

LLNL Beryllium-Affected Worker Case Review

Descriptive Analysis 1998–2010

Presented to the Beryllium Health and Safety Committee

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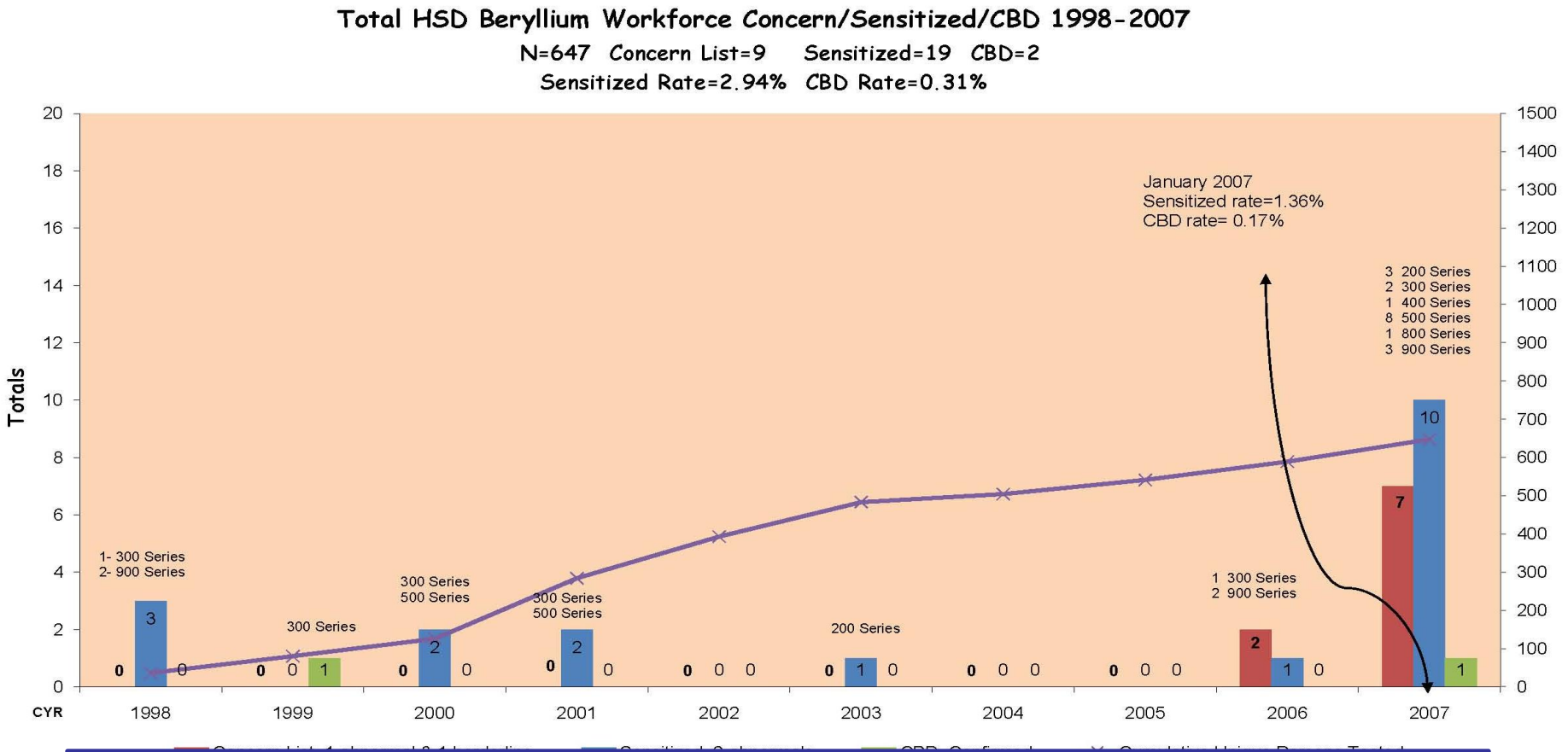
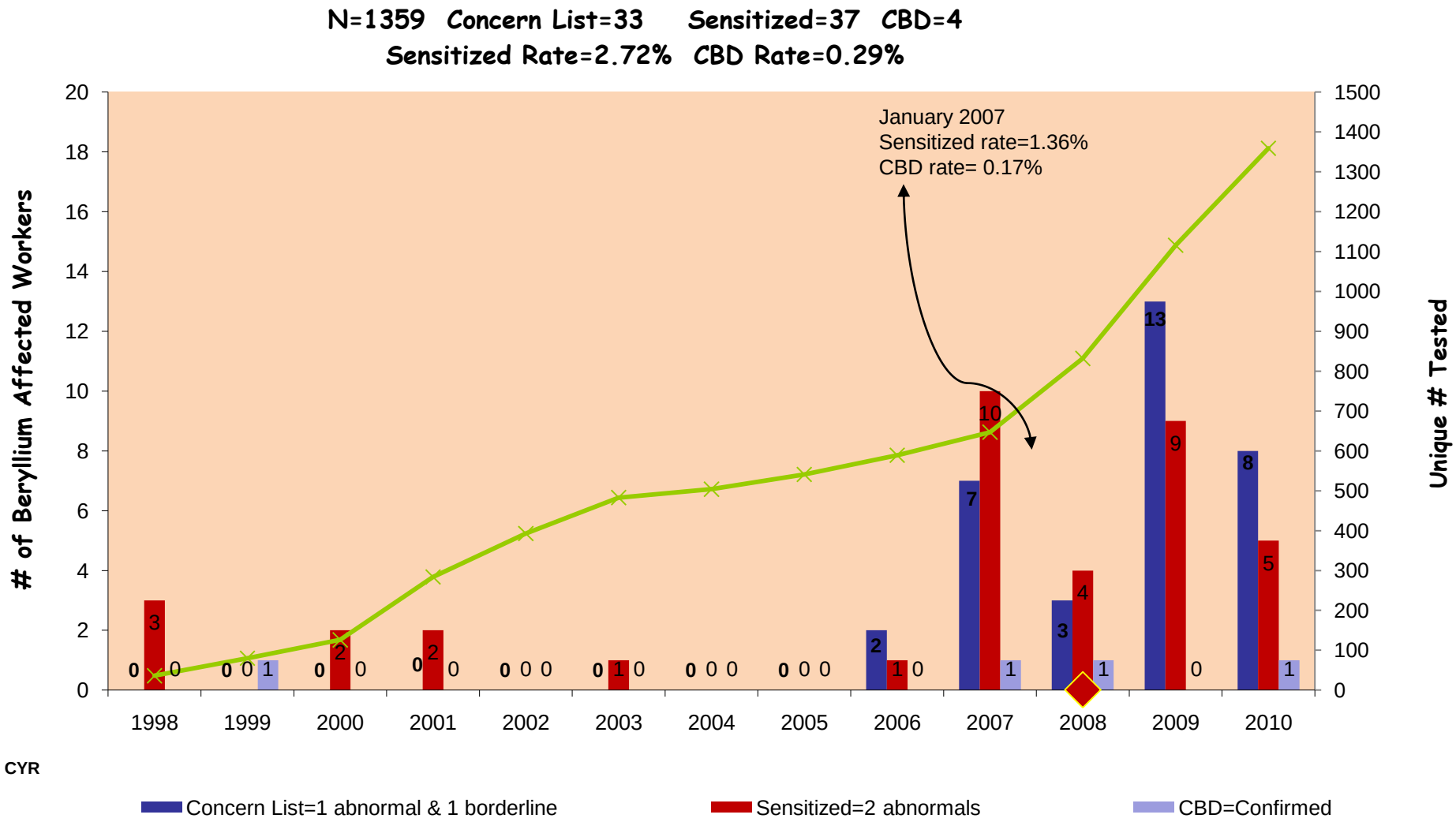
Prior to 2007 medical surveillance population was predominantly hands-on workers such as machinists – 1.36% sensitization



Exposure monitoring data did not indicate uncontrolled activities.
Out of 548 air samples (2007), 38 above DL, 0 above AL

Beginning in 2007, medical surveillance expanded to indirect and incidental workers



A number of inherent constraints complicate the analysis of Be-affected workers

- Genetic variability in the development of beryllium sensitivity
- Limitations of the BeLPT test itself
  - temporal relationship between abnormal/borderline result and when Be exposure may have occurred
  - LLNL work environment
  - research and development workforce is heavily matrixed
  - Personal beryllium exposure sampling limited

LLNL has conducted 3 analyses of LLNL HSD's identified Be-Affected workers since 2009

- March 2009 – "LLNL Beryllium Sensitization/Concern Cases Descriptive Analysis 1998–2008"
  - preliminary report covering 38 Be-affected workers
- July 2009 – "Lawrence Livermore National Laboratory Beryllium-Affected Cases, 1998-2009"
  - epidemiologic descriptive analysis conducted by Bill Stange, PhD, ORAU of 46 Be-affected workers
  - a comparative review of 61 Be-affected workers identified through "former worker programs"
- February 2011 – "LLNL Beryllium-Affected Worker Case Review: Descriptive Analysis 1998-2010"
  - cumulative review of 74 Be-affected workers

Summary of cumulative review of 74 Be-Affected workers identified between 1998 - 2010

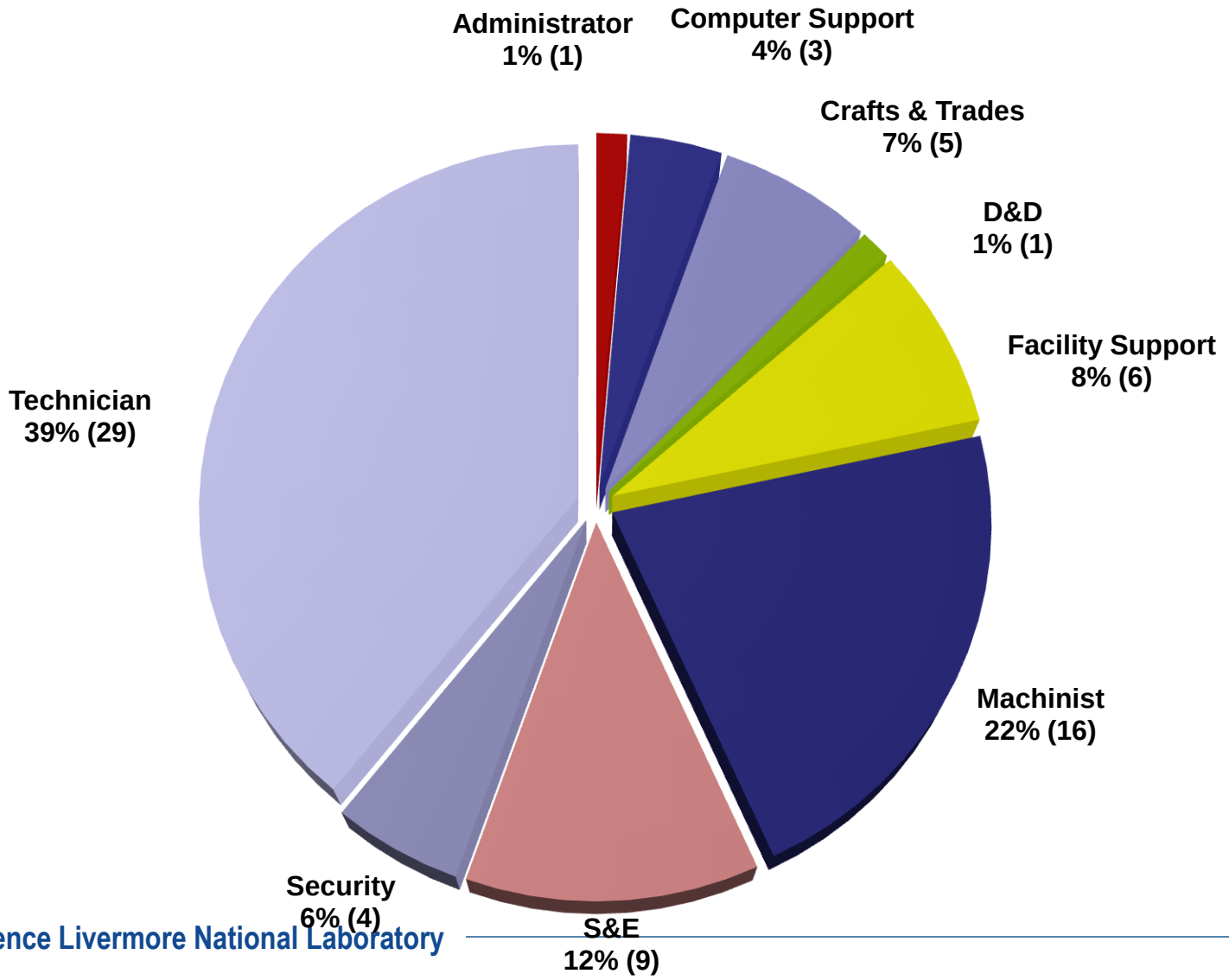
- Sensitization rate of 2.72% (37/1359) similar to DOE registry rate of 2.0% (355/17,716)
- CBD rate of 0.29% (4/1359) is *less than half* DOE registry rate of 0.8% (134/17,716)
- "Concern" rate is 2.4% (33/1359)
  - No comparable DOE registry rate –conservative/protective approach
- Indirect and incidental activities may be at risk for Be sensitization
  - e.g. computer network, electrical, carpentry, security, H&S services, facility inspection, and locks & keys
- Of the 4 CBD cases - none require treatment to date,
  - 2 crafts,1 machinist and 1 waste worker
- Craft workers both report working in LLNL Be machine shop, machinist worked at Rocky Flats and LLNL Be machine shop
- Twenty three percent (17/74) were employed less than 10 years
- Over 50% (38/74) reported work histories in LLNL Be machine shop
- Exposure monitoring limited and well below current occupational exposure limits

Comparison of DOE Sites

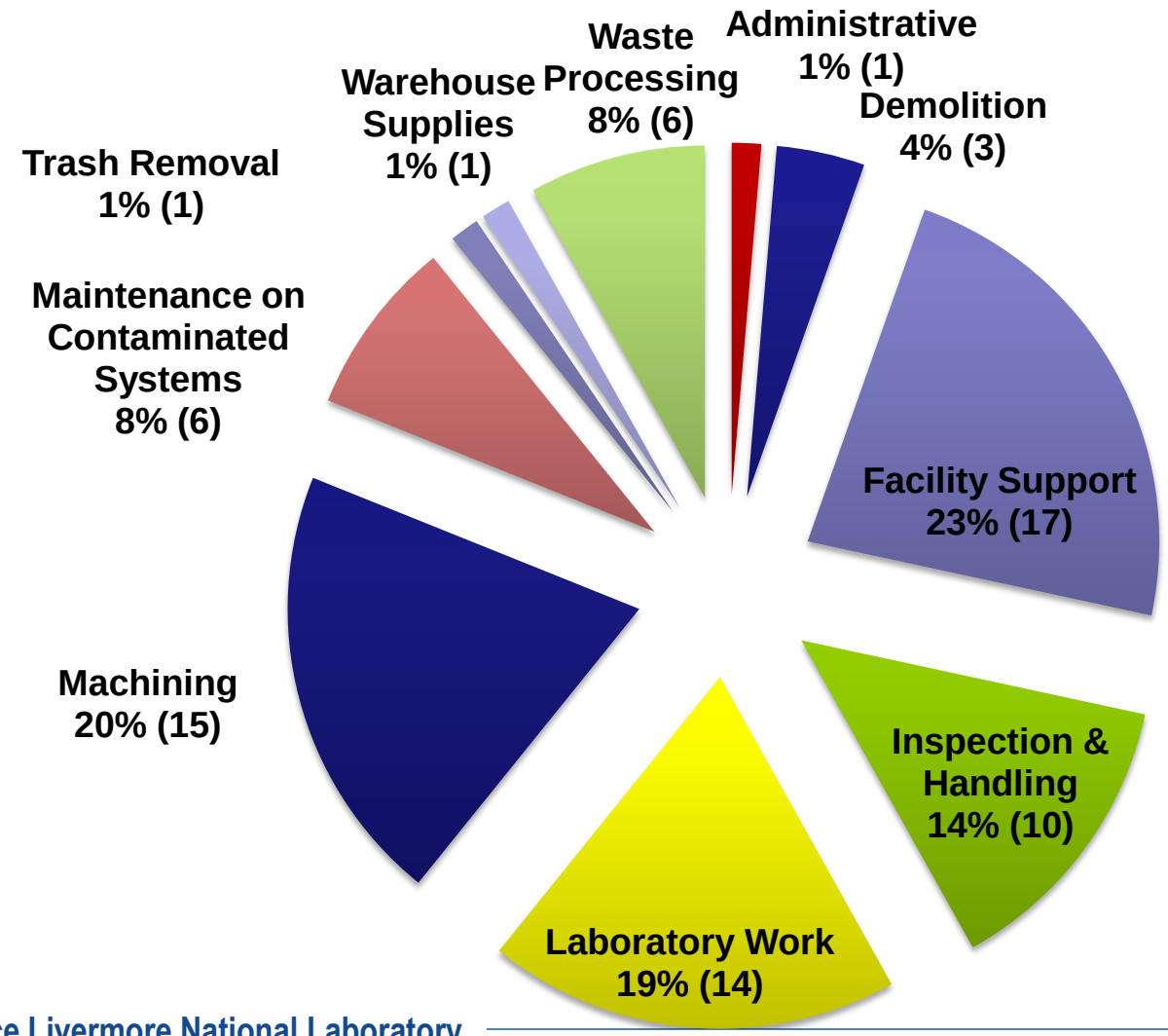
Site	Workers Tested	Be-Affected Workers Rates		
		Concern	Sensitized	CBD
Hanford*	5,441	NI	76 (1.4%)	32 (0.6%)
Y-12*	2,405	NI	92 (3.8%)	55 (2.3%)
LANL*	2,171	NI	18 (0.8%)	3 (0.1%)
LLNL – 2010**	1,359	33	37 (2.72%)	4 (0.29%)
DOE Overall*	17,716	NI	355 (2.0%)	134 (0.8%)

***Source: 2010 DOE Be Registry[C] information is based on information ending in February 18, 2011.**
****Source: LLNL Health Services Department**
NI: Not Identified. The Be Registry does not collect "Concern" data.

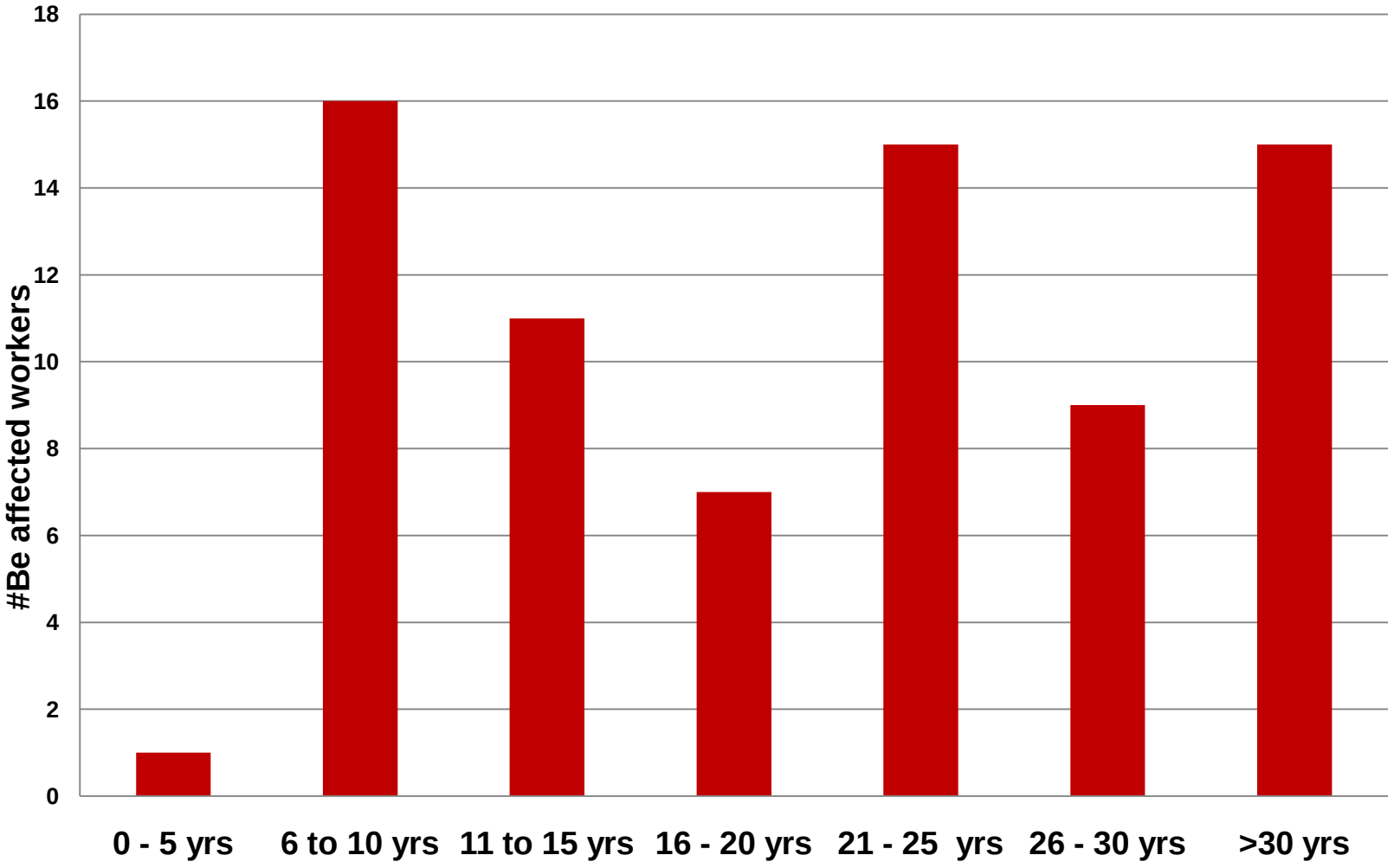
A variety of Functional Job *Titles* are found among the 74 Be-affected workers



A wide variety of Functional Job *Activities* are found among the 74 Be-affected workers



Years of employment at LLNL of the 74 Be-affected workers



Multiple factors contributed to the identification of 28 new cases from April 2009 to December 2010

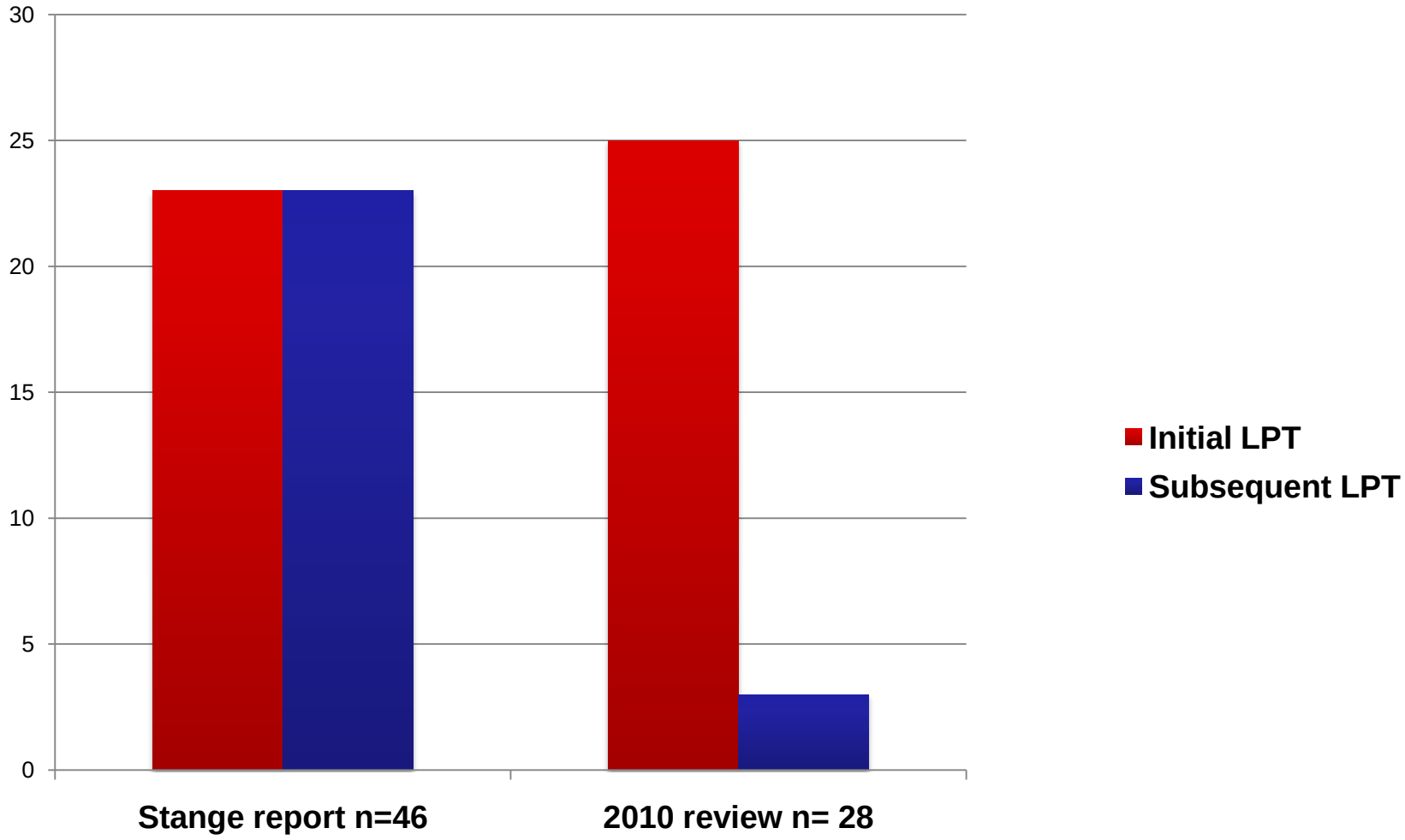
- Participation in medical surveillance has increased from 250% increase from January 2009

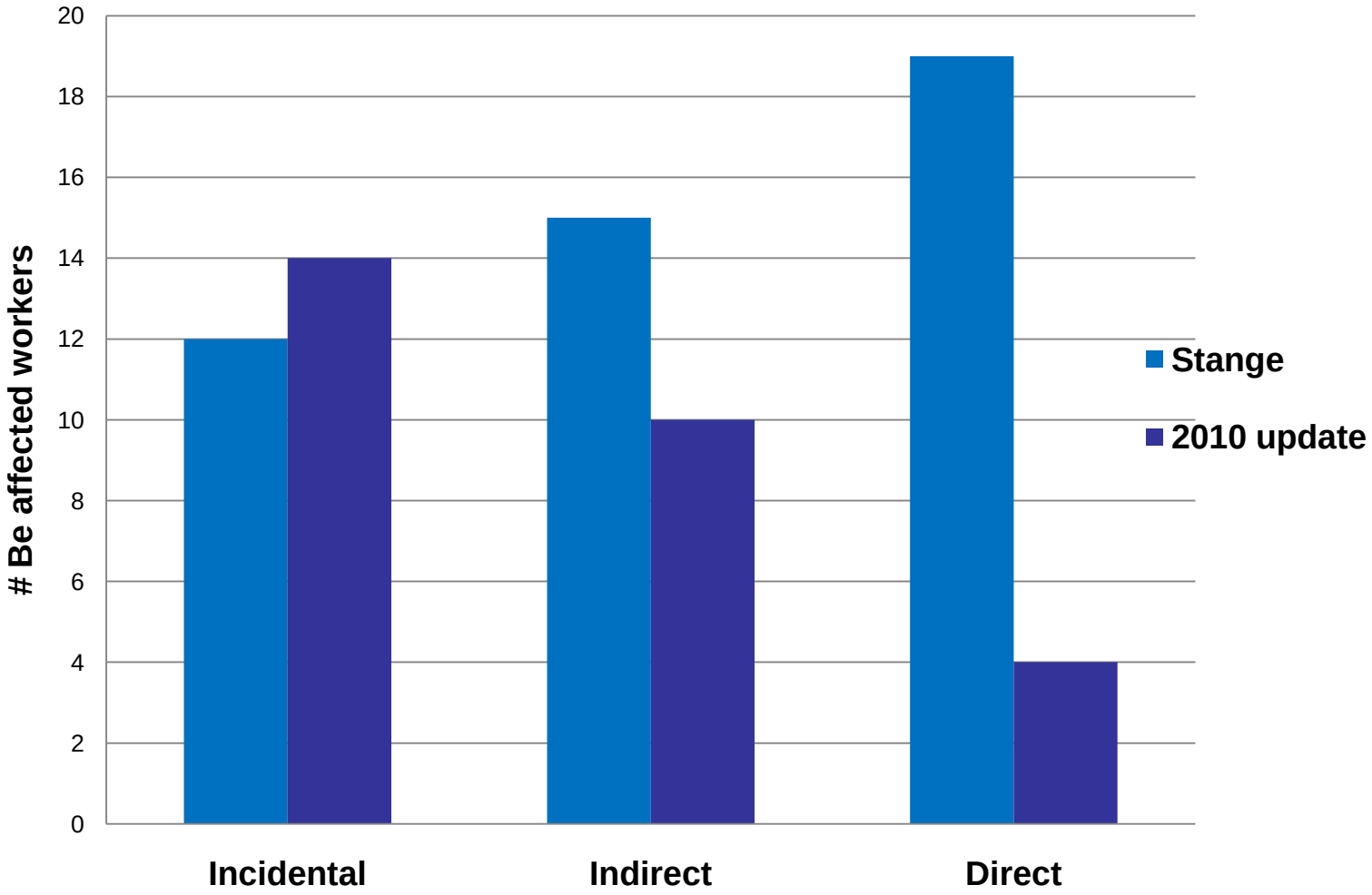
- Emergence of sensitization/concern in individuals whose exposures were likely to have been “incidental” or “indirect” (e.g. crafts, health and safety personnel, security, computer technicians)

The 28 Be-affected workers identified after April 2009 have differences and similarities to the 46 identified before April 2009

- More than 90% (25/28) were identified as abnormal/borderline on *initial* BeLPT testing
- Almost 43% (12/28) were employed less than 10 years
- Workers continue to have histories which include either active beryllium operations, task-based activities involving beryllium, or facilities with historical beryllium activities
- The following buildings and locations continue to be most frequently reported work locations: LLNL Be machine shop, B131 High Bay, Site 300 bunkers (B801A, B850, and B851), B231, B241, and B391

Majority of 28 Be-affected workers identified after April 2009 had not previously participated in Be medical surveillance




Be affected workers
20
18
16
14
12
10
8
6
4
2
0
Incidental
Indirect
Direct
Stange
2010 update

Possible Implications

- In June 2010, UCSF's Arjomandi, et al, reviewed 50 current and former LLNL workers - suggests that lower Be exposure may result in a smaller proportion of sensitized workers going onto CBD when compared to workers other sites with higher exposures

- There are informed consent and patient counseling issues associated with screening a Be exposed population with a low rate of CBD that is mostly sub-clinical

- Less invasive approaches to medical assessment of sensitized workers from low-exposure populations may be reasonable

Comparison of Be sensitization and CBD rates at DOE nuclear facilities

Facility	Rocky Flats current and former	DOE Beryllium Registry	LLNL current and former
Workers tested with BeLPT	8687	17,716	3688
Total Be sensitized workers	321 (3.6%)	355 (2.0%)	114 (3.1%)
Workers with CBD	131 (1.5%)	134 (0.8%)	12 (0.3%)
% of sensitized with CBD	40.8%	37.7%	10.5%

Conclusions from LLNL 2010 review

- Multiple factors
  - No single activity, location, or job function explains all of our cases
- Low level and incidental exposure can lead to beryllium sensitivity/concern or CBD
- Importance of characterization of buildings/work areas for beryllium to eliminate legacy exposures
- Encourage participation in medical surveillance by all types of potentially exposed workers
- Include outreach to those with indirect and incidental exposures